

Amendments to the Claims:

Claim 63 has been amended herein to correct a spelling error. Please note that all claims currently pending and under consideration in the referenced application are shown below. Please enter these claims as amended. This listing of claims will replace all prior versions and listings of claims in the application.

Listing of Claims:

1. (previously presented) A data acquisition and telemetry system, comprising:
at least one probe configured for communication with at least one soil medium; and
a reader, said reader configured for transmitting at least one excitation signal having at least an energy component to said at least one probe and including blocking circuitry for substantially preventing the at least one excitation signal from being received by the reader, said at least one probe configured for using said energy component of said excitation signal to:
generate transitory electromagnetic energy sufficient to provide power for said at least one probe to:
measure at least one moisture parameter of said at least one soil medium; and
transmit at least one data signal corresponding to said at least one moisture parameter, said at least one data signal being received by said reader.
2. (original) The data acquisition and telemetry system according to Claim 1, wherein said at least one data signal comprises a digital carrier signal modulated to indicate a measured value of said at least one parameter.
3. (original) The data acquisition and telemetry system according to Claim 2, wherein said digital carrier signal is at least frequency modulated.

4. (original) The data acquisition and telemetry system according to Claim 1, wherein said at least one excitation signal comprises a modulated carrier signal.
5. (original) The data acquisition and telemetry system according to Claim 1, wherein said at least one data signal has a frequency corresponding to a measured value of said at least one parameter.
6. (original) The data acquisition and telemetry system according to Claim 1, wherein said energy component of said at least one excitation signal comprises radio frequency energy.
7. (original) The data acquisition and telemetry system according to Claim 1, wherein said at least one excitation signal and said at least one data signal have substantially different frequencies.
8. (original) The data acquisition and telemetry system according to Claim 1, wherein said at least one excitation signal and said at least one data signal have substantially equal frequencies.
9. (canceled)
10. (canceled)
11. (previously presented) The data acquisition and telemetry system according to Claim 1, wherein said at least one moisture parameter comprises moisture content of said soil medium.
12. (previously presented) The data acquisition and telemetry system according to Claim 1, wherein said at least one moisture parameter comprises soil matrix water potential.

13. (original) The data acquisition and telemetry system according to Claim 1, wherein said at least one probe and said reader each comprise respective means for receiving and transmitting signals, said respective means for receiving and transmitting signals cooperating with each other to establish an inductive couple between said at least one probe and said reader, said inductive couple facilitating at least transfer of data and energy between said at least one probe and said reader.

14. (original) The data acquisition and telemetry system according to Claim 13, wherein each of said respective means for receiving and transmitting signals comprises at least one transmit/receive coil.

15. (original) The data acquisition and telemetry system according to Claim 13, wherein each of said respective means for receiving and transmitting signals comprises at least one antenna.

16. (previously presented) The data acquisition and telemetry system according to Claim 1, wherein said reader is configured to selectively transmit said at least one excitation signal.

17. (previously presented) The data acquisition and telemetry system according to Claim 1, wherein said reader is configured to convert said at least one data signal to corresponding moisture content data.

18. (original) The data acquisition and telemetry system according to Claim 1, wherein said at least one excitation signal further comprises a data component.

19. (original) The data acquisition and telemetry system according to Claim 18, wherein said data component comprises at least one instruction for execution by said at least one probe.

20. (previously presented) A data-acquisition-and-telemetry control system for facilitating substantially real-time management of an object system, comprising:
at least one probe configured for communication with at least one soil medium;
a reader; and
a control module,
wherein,
said reader is configured to transmit an excitation signal having at least an energy component to
said at least one probe and substantially prevent the excitation signal from being received
by the reader,
said at least one probe is configured for using said energy component to generate transitory
electromagnetic energy sufficient to provide power for said at least one probe to measure
at least one parameter of said at least one soil medium and to transmit a data signal
received by said reader,
said reader is configured for generating, and then transmitting to said control module, at least one
set of instructions corresponding to said data signal received from said at least one probe,
said control module is configured for converting said at least one set of instructions into at least
one control signal, and said control module transmitting said at least one control signal to
the object system so as to cause a corresponding response by the object system.
21. (original) The data-acquisition-and-telemetry based control system according to
Claim 20, wherein said excitation signal comprises a modulated carrier signal.
22. (original) The data-acquisition-and-telemetry based control system according to
Claim 20, wherein said excitation signal further comprises a data component.
23. (original) The data-acquisition-and-telemetry based control system according to
Claim 20, wherein said data signal comprises a modulated carrier signal.

24. (original) The data acquisition and telemetry control system according to Claim 20, wherein said at least one probe and said reader each comprise respective means for receiving and transmitting signals, said respective means for receiving and transmitting signals cooperating with each other to establish an inductive couple between said at least one probe and said reader, said inductive couple facilitating at least transfer of data and energy between said at least one probe and said reader.

25. (original) The data acquisition and telemetry system according to Claim 24, wherein each of said respective means for receiving and transmitting signals comprises at least one transmit/receive coil.

26. (original) The data acquisition and telemetry system according to Claim 24, wherein each of said respective means for receiving and transmitting signals comprises at least one resonant antenna.

27. (previously presented) The data acquisition and telemetry system according to Claim 20, wherein said reader further comprises a data link configured for facilitating download of data obtained from said data signal to at least one remote site.

28. (previously presented) The data acquisition and telemetry system according to Claim 27, wherein said at least one remote site comprises a website on a global computer network.

29. (previously presented) The data acquisition and telemetry system according to Claim 20, further comprising a feedback loop between said control module and the object system, said control module operably coupled to said feedback loop at least to monitor object system responses.

30. (previously presented) A probe for use in conjunction with a reader to facilitate measurement of moisture content of soil, comprising:

a body; and

at least one electronic circuit attached to said body and configured for operative communication with the soil, said at least one electronic circuit consisting essentially of a moisture sensing capacitor and an inductive loop, wherein an energy component of an excitation signal transmitted to the probe by the reader is sufficient to induce the at least one electronic circuit to resonate substantially near a resonant frequency of the at least one electronic circuit, the resonant frequency being a data signal transmitted to the reader indicating the moisture content of the soil.

31. (canceled)

32. (canceled)

33. (canceled)

34. (previously presented) The probe according to Claim 30, wherein said moisture sensing capacitor has a capacitance which varies according to the moisture content of the soil so that said resonant frequency of said at least one electronic circuit is primarily determined by said capacitance of said moisture sensing capacitor operably coupled to said inductive loop.

35. (previously presented) The probe according to Claim 30, wherein said at least one electronic circuit comprises a variable frequency oscillator, said energy component causing said variable frequency oscillator to resonate so as to produce said data signal.

36. (original) The probe according to Claim 35, wherein said variable frequency oscillator comprises at least one moisture sensing capacitor having a capacitance which varies according to the moisture content of the soil proximate to the probe so that said resonant frequency of said variable frequency oscillator is primarily determined by said capacitance of said moisture sensing capacitor.

37. (previously presented) The probe according to Claim 30, wherein said moisture sensing capacitor comprises a hydrophilic dielectric.

38. (original) The probe according to Claim 37, wherein said hydrophilic dielectric of said moisture sensing capacitor substantially comprises said soil.

39. (previously presented) The probe according to Claim 30, wherein said at least one electronic circuit comprises at least one moisture sensing capacitor having a capacitance which varies according to the moisture content of the soil and configured for producing a discharge signal analogous to the moisture content of the soil so as to facilitate production of said data signal.

40. (canceled)

41. (canceled)

42. (previously presented) A moisture mapping system for facilitating a substantially real-time determination of moisture content of a zone of interest, comprising:
at least one probe for communication with the zone of interest;
a reader for selectively transmitting an excitation signal to said at least one probe, said at least one probe configured for using an energy component of said excitation signal to measure the moisture content of the zone of interest and to transmit a corresponding data signal to said reader, said corresponding data signal indicating the moisture content of the zone of

interest, said reader including blocking circuitry for substantially preventing the excitation signal from being received by the reader and configured for processing said data signal so as to determine a corresponding value of the moisture content of the zone of interest and storing said corresponding value of the moisture content of the zone of interest, said corresponding value of the moisture content of the zone of interest comprising a moisture map of the zone of interest; and means for transporting said reader throughout the zone of interest so as to place said reader in operative communication with said at least one probe.

43. (original) The moisture mapping system according to Claim 42, wherein said excitation signal and said data signal are digital, and said processing of said data signal by said reader comprises demodulation of said data signal.

44. (original) The moisture mapping system according to Claim 42, wherein said data signal has a frequency corresponding to the moisture content of the zone of interest, and said reader converts said frequency of said data signal into said corresponding value of the moisture content of the zone of interest.

45. (original) The moisture mapping system according to Claim 42, wherein said means for transporting said reader comprises an irrigation system.

46. (original) The moisture mapping system according to Claim 42, wherein said reader and said at least one probe each comprise a respective transmit/receive antenna, said respective transmit/receive antennas cooperating to facilitate formation of an inductive couple between said reader and said at least one probe, said inductive couple facilitating transfer of at least data and energy between said reader and said at least one probe.

47. (previously presented) A precision irrigation system for facilitating substantially real-time moisture content evaluation and irrigation of an agricultural field, comprising:

a plurality of probes for measuring moisture content in operative communication with the agricultural field;

a reader configured for transmitting an excitation signal to said plurality of probes and including blocking circuitry for substantially preventing the excitation signal from being received by the reader, said plurality of probes being structured such that an energy component of said excitation signal causes each probe that receives said excitation signal to determine moisture content of soil proximate to said each probe, respectively, and said plurality of probes being further structured such that said energy component causes said each probe to generate transitory electromagnetic energy sufficient to provide power for said each probe and transmit a data signal corresponding to said moisture content to said reader;

a mobile irrigation structure having a plurality of nozzles attached thereto, said plurality of nozzles being in fluid communication with a water source, and said mobile irrigation structure configured for transporting said reader throughout the agricultural field so as to facilitate operative communication between said reader and said plurality of probes; and

a control module in operative communication with said reader and with said plurality of nozzles, said control module configured for sending at least one control signal to said plurality of nozzles so as to regulate flow of water therefrom, said control signals corresponding to moisture content data gathered by said reader from said plurality of probes.

48. (original) The precision irrigation system according to Claim 47, wherein said mobile irrigation structure comprises a center pivot irrigation system.

49. (original) The precision irrigation system according to Claim 47, wherein said mobile irrigation structure comprises a linear move irrigation system.

50. (original) The precision irrigation system according to Claim 47, wherein each of said plurality of nozzles is configured for individual control.

51. (original) The precision irrigation system according to Claim 47, wherein said excitation signal further comprises a data component, said data component carrying at least one instruction from said reader to said plurality of probes.

52. (original) The precision irrigation system according to Claim 47, wherein said excitation signal and said data signal are digital.

53. (previously presented) A method for facilitating substantially real-time management of an object system, comprising:

placing at least one probe in communication with a soil medium;
establishing an inductive couple between said at least one probe and a reader;

transmitting at least energy from said reader to said at least one probe by way of said inductive couple and substantially preventing the energy from being received by the reader, said energy being sufficient to provide transitory power for said at least one probe and cause said at least one probe to measure at least one parameter of said soil medium and to transmit at least a data signal to said reader by way of said inductive couple, said data signal indicating a measured value of said parameter;

processing said data signal received by said reader so as to extract at least said measured value of said parameter;

using said measured value of said parameter to generate at least one set of instructions;

translating said at least one set of instructions into at least one control signal; and

transmitting said at least one control signal to the object system so as to cause at least one corresponding response by the object system.

54. (original) The method according to Claim 53, wherein establishment of said inductive couple is facilitated by transporting said reader into operative communication with said at least one probe.

55. (original) The method according to Claim 53, wherein establishment of said inductive couple is facilitated by transporting said at least one probe into operative communication with said reader.

56. (previously presented) The method according to Claim 53, wherein at least establishing an inductive couple, transmitting at least energy from said reader, processing said data signal received by said reader, using said measured value, and translating said at least one set of instructions are performed substantially in real time.

57. (previously presented) The method according to Claim 53, wherein establishing an inductive couple, transmitting at least energy from said reader, processing said data signal received by said reader, using said measured value, and translating said at least one set of instructions are performed substantially continuously.

58. (previously presented) The method according to Claim 53, further comprising monitoring said at least one corresponding response by the object system.

59. (previously presented) The method according to Claim 53, further comprising using said reader to transmit data to said at least one probe by way of said inductive couple so as to facilitate control of said at least one probe by said reader.

60. (previously presented) The method according to Claim 53, wherein processing said data signal received by said reader comprises demodulating said data signal.

61. (previously presented) The method according to Claim 53, wherein at least establishing an inductive couple and transmitting at least energy from said reader occur substantially simultaneously.

62. (previously presented) A soil moisture sensor for measuring moisture content of soil in an agricultural field, comprising:

a plurality of probes, each of said plurality of probes having an electronic circuit with a moisture sensing capacitor configured for operative communication with the soil, each said moisture sensing capacitor having a hydrophilic dielectric so that capacitance of each said moisture sensing capacitor varies so as to at least indirectly correspond to moisture content of the soil adjacent thereto, and each of said plurality of probes having a tuned circuit receive/transmit antenna; and

a reader, said reader having at least one tuned circuit receive/transmit antenna selectively transmitting a digital excitation signal to each said tuned circuit receive/transmit antenna of said plurality of probes and blocking circuitry for substantially preventing the digital excitation signal from being received by the reader, said digital excitation signal cooperating with said at least one tuned circuit receive/transmit antenna of said reader and respective tuned circuit transmit/receive antennae of said plurality of probes so as to facilitate establishment of an inductive couple between said reader and said plurality of probes, said plurality of probes being structured such that an energy component of said digital excitation signal energizes at least a portion of each of respective said electronic circuits so that respective said moisture sensing capacitors each produce an analog signal corresponding to the moisture content of the adjacent soil, and respective said analog signals are converted to respective digital carrier signals and modulated so as to produce a digital data signal indicating moisture content of the adjacent soil for transmission by respective said transmit/receive antennae to to said reader.

63. (currently amended) A data acquisition and telemetry system, comprising: a reader configured for transmitting at least one excitation signal having at least an energy component and receiving at least one data signal from at least one probe; and at least one probe having at least one electronic circuit ~~configured~~ configured for operative communication with the soil medium, the at least one electronic circuit consisting essentially of a moisture sensing capacitor and an inductive loop, wherein the at least one probe is configured such that the energy component of the at least one excitation signal as received by the at least one probe is sufficient to induce the at least one electronic circuit to resonate substantially near a resonant frequency of the at least one electronic circuit, the resonant frequency being the at least one data signal transmitted to the reader corresponding to at least one moisture parameter of the soil medium.

64. (previously presented) The data acquisition and telemetry system according to Claim 63, wherein the energy component of the at least one excitation signal comprises radio frequency energy.

65. (previously presented) The data acquisition and telemetry system according to Claim 63, wherein the at least one moisture parameter comprises moisture content of the soil medium.

66. (previously presented) The data acquisition and telemetry system according to Claim 63, wherein the at least one moisture parameter comprises soil matrix water potential.

67. (previously presented) The data acquisition and telemetry system according to Claim 63, wherein the at least one excitation signal is selectively transmitted by the reader.

68. (previously presented) The data acquisition and telemetry system according to Claim 63, wherein the reader converts the at least one data signal to corresponding moisture content data.